The Northwestern MILLER
MILLING PRODUCTION SECTION

Special report . . . **. . . on visit to USSR**

U.S. RUNNING BEHIND RUSSIA IN FACILITIES FOR TRAINING MILLING TECHNOLOGISTS

'It is easy to answer the question regarding where the U.S. stands in milling education compared to the Soviet Union, Western Germany and Switzerland, because the aforementioned countries have equipment for training students in this field, and the U.S. does not.'

By Dr. John A. Shellenberger
Head, Department of Flour and Feed Milling Industries, Kansas State College

THE launching of Sputnik I by the Soviet Union in October, 1957, served as a giant alarm to arouse the American people from their smug assumption that the U.S. led in all phases of scientific endeavor. Why the average citizen should have had the preconceived idea that the U.S. leads in all phases of technical achievement is difficult to understand since scientists are well aware that the basis of much of the applied research, development and industrial production for more than a century has been based on principles developed from basic research work done principally in Europe. Therefore, it was not surprising that the Sputnik Age suddenly caused educators, politicians, businessmen and the general public to face the uncomfortable fact that the U.S. was running second in the technological race for outer space exploration.

At first, public concern was focused almost entirely on catching up or surpassing the Soviet Union in the field of ballistic missiles, but gradually the thought began to prevail that it might be necessary to do some "catching up" in many other fields. Considerable soul searching has been done regarding not only the number of trained scientists and engineers available for employment in the U.S., but also the basic soundness of our educational programs which produced these scientists and engineers. It was generally agreed that it was none too soon to commence, collectively, to investigate where we stand and how we compare with the Soviet Union in our technical and research endeavors in all fields of our agricultural and industrial economy. It was in an endeavor to obtain some information on which to make comparisons in the field of cereal technology that I decided that if it could be arranged, I should like to have an opportunity to visit the USSR Milling Engineering School and the Scientific Research Institute for Grain, both in Moscow.

VIENNA MEETING. My plans included a week at a meeting of the International Association for Cereal Chemistry in Vienna where I would be with delegates from the Soviet Union as well as those from 18 other countries. Assurance had been given by the president of IACC that at the Vienna meeting, the Russian delegates would participate in the program and not merely be present as observers as had been the case at previous meetings in Vienna and Hamburg. With this in mind, and knowing that Dr. Natalie Kozmina, director of the Soviet Scientific Research Institute for Grain, was to be there, I wrote to find out if it would be permissible for me to visit the milling school and the institute following the Vienna meeting. Promptly, a cordial invitation was received to visit the institutes and shortly thereafter a visa for entrance into the USSR was obtained, along with assurances that I would be welcome to visit the Soviet Milling Engineering School.

During the Vienna meeting, there were a number of opportunities to visit with Dr. Kozmina, who is an extremely competent scientist with a sense of humor and a very kindly appearance, and also with Dr. Ljubarsky, the representative of the USSR in IACC. Unfortunately, both Dr. Kozmina and Dr. Ljubarsky went to Poland after the Vienna meeting, so I did not see them while I was in Moscow.

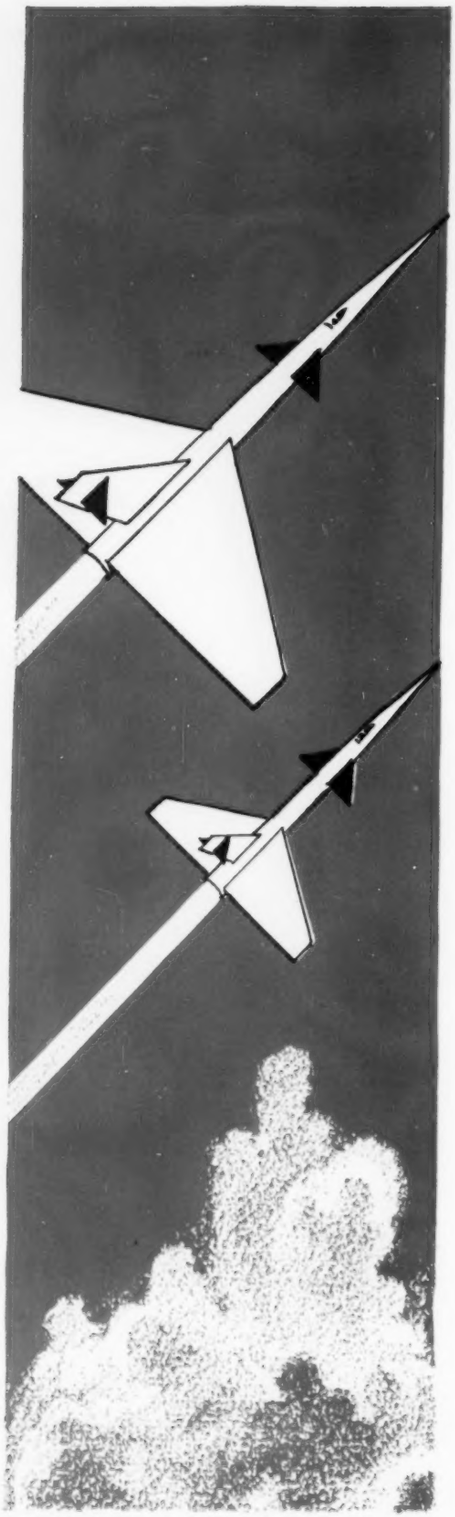
Dr. Natalie Kozmina, director, USSR Scientific Research Institute for Grain, left, and Dr. John A. Shellenberger. This picture was taken prior to Dr. Shellenberger's visit to Russia.

VISIT TO MILLING SCHOOL. On arriving in Moscow, I went first to the USSR Milling Engineering School. It is located in the older part of the city. I was met by Dr. L. F. Aizikovitch, the school's director, and taken to his office where there were introductions to several members of his staff. I was told that I was a most welcome guest and that they were particularly glad to have me because I was the only citizen of the U.S. to visit the school since the war. I replied that I considered it a privilege to be there and was looking forward to comparing ideas with them because of my own association and interest in education. Also, I told them that they should not feel too slighted by lack of visitors from the U.S., because my own school had not, to my knowledge, had a visitor from the Soviet Union since Dr. Kozmin visited Dr. C. O. Swanson in 1928.

I explained that although there had been a number of groups in the U.S. from the USSR with interests in flour milling, apparently no one arranging the itinerary considered it important to visit the only milling school in the U.S. It was agreed that perhaps the present interest in technical education throughout the world may bring greater appreciation of the role which technical training programs play in the scheme of education and the influence this training has on the future welfare of nations. If this is understood, then perhaps visits to milling schools in both countries will become the accepted procedure for visitors.

The outstanding feature of the USSR milling school is the completely modern, clean, well-arranged pneumatic flour mill of 150 tons (550 bu.) capacity per 24 hours. The students benefit by receiving their training in this modern mill, which has, apparently, a complete and competent staff. There are approximately 100 students who come from milling enterprises throughout the Soviet Union and its satellites. To enter the milling engineering school, the students must have had some industrial experience in milling technology and be recommended by the manager of the mill where they were employed. The students receive, while attending school, the same salary as when employed, so long as they pass their examinations.

(Turn to VISIT TO USSR, page 15a)



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AOM Committees Plan for 1959 Technical Conference . . .

PLANNING for the 63rd annual technical conference of the Association of Operative Millers to be held at the Hotel Sherman in Chicago May 11-14 occupied a good deal of the attention of officials during the Minneapolis meetings at the end of January. Prominent in the discussions were Richard C. Bradford, international president; O. C. Spohn, Ismert-Hincke Milling Co., vice president and Don S. Eber, executive vice president. The technical committee spent time planning for the "What's New" Session at Chicago, and it is planned for 20 manufacturers to demonstrate and describe their latest developments before the full attendance on May 13. Most of the exhibit booths have been booked, but Mr. Eber reports that some positions are still available. Members of management, it is hoped, will look in on the work of the technologists because the annual convention of the Millers National Federation will be running in Chicago at the same time. As usual, several overseas visitors are expected because AOM is international in scope and members in the U.S. and Canada benefit from the contacts they make with millers from other countries.

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Pictured as he prepared to open a session of AOM's technical research committee is Tibor Rozsa, the Pillsbury Co., chairman of the group which registered a 100% attendance at the meeting. With him his committee secretary, Marian Reeves. Comments Mr. Rozsa: "I have a real good committee, it wants to work and is working well."

Educational committee chairman, Prof. Eugene P. Farrell, Kansas State College, center, watches as Stephen J. Loska, Jr., the Pillsbury Co., amends a section of the rapidly-developing Cereal Millers' Handbook which will be published for AOM. Standing at left is Arlin B. Ward, the Pillsbury Co.

At the District 4 meeting new officers were elected. Seated in front at left is Marvin Shaw, Bay State Milling Co., new chairman, and George Tooker, Commander-Larabee Milling Co., vice chairman. Standing at the back, left to right are William Howie, J. K. Howie Co., veteran secretary-treasurer; Kenneth Nordstrom, General Mills, Inc.; Robert C. Ellis, International Milling Co.; Al Mayer, Russell-Miller Milling Co., aad William Henson, Hubbard Milling Co., all committeemen.

Educational committee members have a pre-session discussion. Reading from left to right are Stuart Butler, Maple Leaf Milling Co.; Ted Betker, General Mills, Inc.; Arthur N. Hibbs, International Milling Co., and Walter R. Wichser, Quaker Oats Co. All are preparing contributions to the Cereal Millers' Handbook.

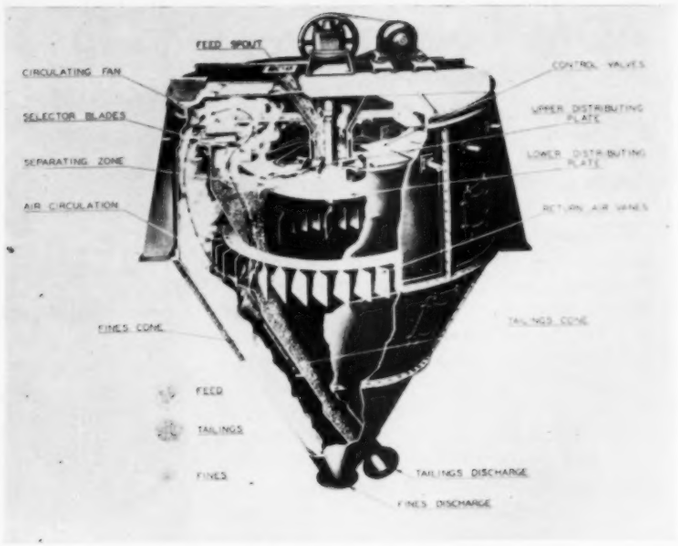
A feature of the two-day meeting session of the committees, which was followed by a meeting of District 4, AOM, on the third day, was a party given by the Allied Trades Committee of the district in the Clubroom of The Northwestern Miller and Milling Production. Seen at left is L. H. Patton, the E. H. Leitte Co., treasurer, and Wayne Carmichael, Merck & Co., co-chairman. Ot Zimmerman, SMICO, is the other chairman and Max Springer, the Day Co., is secretary.

A highlight of the meeting was a call by Ot Zimmerman, SMICO, a former AOM president, for a membership drive in District 4. He voiced his appeal not only as a former prexy but as a member of the Allied Trades group. Mr. Zimmerman, seen at left, suggested that David Mattson, Atkinson Milling Co., national executive committeeman be asked to head the drive, a suggestion unanimously accepted by the membership. Mr. Mattson, seen at right, immediately got on the job and his success is evident in the enthusiasim shown by Mr. Zimmerman and the apparent: "You've signed him" from J. George Kehr, Russell-Miller Milling Co., national membership chairman. All national executive committeemen are members of Mr. Kehr's committee and it is hoped that other districts not operating a membership drive will follow the example of District 4.

Centrifugal Air Separation Used In Milling Industry

'Externally, most air separators look very much alike. They are similar in shape to cyclone collectors—which basically is what they are. Internally, the mechanics and method of particle-size control vary with the manufacturer.'

By William T. Doyle
Chairman of the Board
Sturtevant Mill Co.



Cross section of Sturtevant air separator.

HE machines known to the milling industry as air separators frequently are not well understood. They are not new and should not be considered such, since patent literature shows that this type of machine was in use as early as 1880, removing fine material from a mixture of fine and corase, using controlled air for the operation.

Much of the early patent literature shows that separators were intended for use in the milling industry for the removal of foreign material from grain, and for purifying actions. For quite a period of time, though these machines were not considered highly by the flour industry, or for that matter, by any industry and, for a number of decades, few installations were made. Perhaps this is accountable to the fact that there existed a lack of thorough understanding of the unit's operations and applications. The flour milling industry, only recently, has begun to show a revived interest in the principle of air separation, and separator installations, though few, have shown promising results—most of which are tucked away in the "secret" files of those few millers who have successfully employed the units.

Despite this secrecy, the air separation process is showing great promise in the milling industry as a process improvement, one of the first major process developments in three generations. Only recently, we, at Sturtevant, were able to announce successful production-scale separation of flour particles to 80% through 325 mesh, finer grades than possibly could be obtained by screening, and considerably finer than the "superfine" 16XX now being produced. On byproduct material—wallpaper starch—air separation now is being employed successfully, eliminating the use of 12 screens, producing a finer product and allowing the grinding mills used in conjunction with the classifiers to attain greater capacity.

Experiments Continue

At our Dorchester labs, experimentation is continuing on the separation of starch nodules from the nubs themselves, but, as yet, such separation has not been accomplished with the air separator, which is solely a classifying machine. Other machines are on our experimental drawing boards and in experimental operations which look promising for the milling industry.

In a number of non-metallic industries, however, the air separator has become well established over the past four decades. The fine materials desired by these industries could not be provided by silk bolting cloth or metal cloth screens, and fine metal cloth seems to have proved unsatisfactory because of the heavy weight materials and their abrasive characteristics.

We at Sturtevant fabricated our first separator 40 years ago in 1919. Since then, we have supplied over 1800 for service across the industrial horizon, all over the world. Our first machine was used in the tobacco industry, removing leaf tobacco from the stems. This was a crude separation of rather bulky material, true, but the unit gave us our first full scale production experience and this installation, compounded by hundreds upon hundreds of others in various capacities, has enabled us to adapt and develop the unit. Today's classifier is capable of satisfactorily removing material with a fineness of 99.5% minus 325 mesh, and as fine as 100% through 20 microns. We manufacture these machines varying from 3' to 18' in diameter, capable of receiving as much as 1500 tons per hour and capable of removing up to 75 tons an hour of material testing 98% or better through 200 mesh sieve.

Separators remove only one size material, though, while multi-deck screens can remove several different sizes, and material to be separated or screened often contains different shaped particles, the most easily removed of which are round or cubical particles. The most difficult for the separator to remove are flat or slivery particles like mica. In the case of a screen, these latter simply slide down over the clothing and come off in the oversize product. Where air is used for separation, these materials cause some difficulty because of their increased surface area.

Another drawback in some industries is the close spacing of sizes above and below the size of the product to be removed. This constitutes a problem for air separation, whereas in the case of a screen, the opening itself regulates the size of the product without regard to shape. Therefore, the air separator will not always cut as close as a screen. However, when the air separator follows a grinding machine, this is not of concern, because in many instances it is desirable to return a certain fraction, even of finished size material, in order to grind more effectively the material in the grinding machine.

When it is desirable to remove as much as possible of a certain mesh material to reduce its dusting qualities, it often is uneconomical to remove such by screening. Only an air separator, with its efficiency of operation, can make a satisfactory classification for these purposes.

What is Air Separator?

Externally, most air separators look very much alike. They are similar in shape to cyclone collectors—which basically is what they are. Internally, the mechanics and method of particle size control vary with the manufacturer. The Sturtevant Whirlwind centrifugal air separator is of the type known as central shaft, as differentiated from central tube.

The Sturtevant internal casing is connected to its outer shell by an opening at the top and one in the walls, which has angular blades or deflectors. The central shaft which drives the unit is actuated either by V-belt or a speed reducer direct to the motor supplying the power. It is supported in bearings with a bevel drive gear on top. At the lower end of the shaft is a hub with ports, and directly below this, a plate. Above the port is a tube surrounding the shaft, into which the feed is introduced. The upper portion of the hub carries a larger-diameter plate than the lower, and a series of fan blades is mounted on it. The hub is further extended upward by a tube on which are mounted additional fan blades.

When the shaft is revolved, the lower plate and upper plate with its fan blades revolve, as does the upper fan.

The feed enters through the tube and is ejected through the hub onto the lower plate and discharged into the inner drum forming an umbrella of miscellaneous size material as it is hurled off the revolving plate. The function of the air separator is to draw air through this falling material and select the desired fines. This is achieved in the following manner:

The upper revolving fan, which is the pulling fan, receives its air through the opening of the inner drum. The air is whirled by the upper fan into the outer casing and fine material is whirled into the outer casing. Frictional contact with outer casing walls slows the material until it is gravity-carried downward to its point of emission.

Use Air Over

It is desirable to eliminate a dust collector and use the air over and over again. The stream of dust-laden air whirling down the outer casing causes separation of the material from the air and the relatively clean air, therefore, can pass back inward to the inner casing through the openings provided by the deflectors—the purpose of which is to create a whirl, further removing any dust entrained in the incoming air. The air thus introduced to the inner drum is whirled by the rotation of the members in the drum and, because the upper fan creates suction, it passes upward through the stream of falling material where the first selection is made. It then moves upward between the upper larger plate and the inner drum and inward to the suction side of the fan, whirling all the time. In so doing, the dust-laden air passes through revolving blades on the upper plate, which act as a revolving sizer. The centrifugal whirl throws outward more of the unwanted sizes.

The opening at the top of the inner drum directly below the fan may be increased or decreased by the operation of valves, similar to a diaphragm valve in a camera, and are actuated by the protruding arms extending through the outer casing. The function of these valves is similar to that of a blast gate—to increase or decrease the pull of the top fan.

There are several different methods of control which regulate particle sizes. First, there is a control exercised through variation in the speed of the vertical shaft, which affects

Operator unlocks hatch at side of Sturtevant air separator. This is not a milling installation photo.

the pull of the top fan. Second, the volume of air pulled upward by the top fan can be controlled by opening or closing the diaphragm valves. Third, the number of blades on the larger or upper plate will play a part in particle size control. The lesser number of blades, the coarser the material withdrawn and, correspondingly, the greater number of blades, the finer the material. This is because the more blades create more interference to the inward passage of the dust-laden air than would a lesser number and, therefore, only the finest material can get through.

——BREAD IS THE STAFF OF LIFE——

Districts 3, 6, AOM To Meet March 20-21

Districts 3 and 6 of the Association of Operative Millers have scheduled a joint meeting at the Post Tavern Hotel at Battle Creek, Mich., March 20-21. Members of the districts will be entertained by the allied trades the evening of March 20.

——BREAD IS THE STAFF OF LIFE——

Special Covers Used For Fumigation

One of the biggest problems in the battle against multi-million-dollar-a-year damage by insect pests is how to kill the bugs without the danger of harming other persons or livestock—in other words, how to do a thorough fumigation job with gases, such as methyl bromide, without losing friends and flirting with law suits.

Last summer in Jacksonville, Fla., field tests of a new technique pointed to what observers say is the answer to the problem. Fumigation crews simply covered each house completely with light-weight vinyl coated nylon tarpaulins. Methyl bromide was released into the houses to 60 to 100 lb. pressure and the tarps were removed 24 hours later. No leaking was detected and technicians of Orkin, who conducted the tests, said the houses were made insect free.

The designer of the special covers, M. Stanley Goldberg, vice president of Hoosier Tarpaulin & Canvas Goods Co., Indianapolis, said the method can be used just as effectively by industry. He said vinyl was combined with nylon to make the covers resistant to hard wear and harsh chemicals. Light weight of nylon cut labor costs, he said.

The tarps used in the Jacksonville tests were bright red to warn that dangerous fumigation fumes were underneath. Laboratory tests by Hoosier showed that the tarps were waterproof, non-absorbent and resistant to flame, acid and rot. Fadometer tests showed no fading after 500 hours in Florida sunshine.

These tarps, with seams double lap felled and sealed airtight and gastight, have been designed to cover grain elevators, lumber, boxcars, crops in field, and other home, farm and industrial fumigation work.

A completely covered house with warning signs placed in position.

Nominations Now Being Accepted For Wiley Award

A. H. Robertson, president of the Association of Official Agricultural Chemists, has announced that nominations are now being accepted for the third AOAC Harvey W. Wiley award for achievement in analytical methods. This award, which consists of $500 in cash, goes to the scientist who makes an outstanding contribution to the development of methods of analysis for foods, drugs, cosmetics, feeds, fertilizers and pesticides, or for use in general, analytical chemistry.

These are the fields of interest to the AOAC, encompased in its publication, Official Methods of Analysis. This thousand-page book is the primary laboratory manual of regulatory chemists and research workers in agriculture in the U.S. and throughout the world.

The first award was won by L. C. Mitchell of the Food & Drug Administration for his contributions to the development of many methods of analysis for foods and, more recently, for his contributions toward the development of the techniques of paper chromatography useful in meeting problems arising from the rapidly expanding use of chemical additives in foods.

Nominations must be submitted by April 1, 1959. Nominees need not be members of the association. A general statement regarding the award may be obtained from the secretary, William Horwitz, Box 540, Benjamin Franklin Station, Washington 4, D.C.

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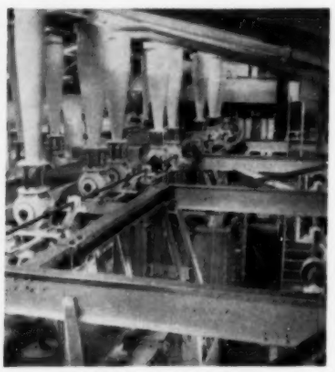
Two-Floor Flour Mill Opened in Australia

BARNES Milling, Ltd., has opened a modern new flour mill at Dalby in Queensland, Australia. The mill was designed and equipped by Thomas Robinson & Son, Ltd., Rochdale, England, and its associated company in Australia. G. F. R. Nicklin, premier of Queensland, was on hand for the ceremonies marking the opening of the mill.

The feature of the new plant is that both the screenroom and the mill are combined on two floors in a building which is described as extremely light and having excellent ventilation. It is a steel framed structure which was specially designed to utilize the economy in space made possible by modern machinery.



Cyclones for the high pressure suction conveying system mounted in the apex of the roof of the mill.

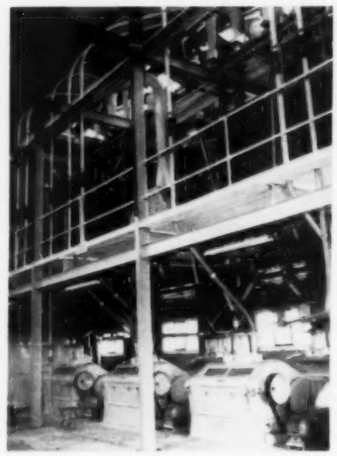
The flour milling plant is a complete pneumatic unit capable of producing two tons flour an hour together with the byproducts, bran and pollard, at the rate of three tons an hour. Work is in hand to install a second two-ton independent flour milling plant in the same building.

The plant incorporates three Robinson square-sieve sifters. There are 10 roller mills of the Pneu-Flow direct pick-up type, the stock being lifted to cyclones in the apex for delivery to the sifters on the upper floor. Also on this floor are two purifiers with double-tiered sieves. The auxiliary plant includes dust collection system, a bran brush, beaching plant and a battery of automatic packers.

The mill's intake of bulk or bagged grain is received at the rate of 60 tons wheat per hour in a large tipping hopper, the grain being automatically weighed, pre-cleaned and delivered into four 6,500 bu. silos.

First in Australia

The Pneu-Flow pressure conveying system installed in the new mill is reportedly the first screenroom pneumatic blowing system to be installed in Australia. Two blowers are provided, each giving two lifts. The first blower takes stock from a disc separator on the ground floor to a cyclone in the apex which feeds the wheat to a waterwheel damper prior to its delivery to any of four 1,000 bu. conditioning bins.



General view of the mill showing the single platform floor.

A secondary lift from the cyclone, however, actually makes the first pick-up of wheat from separator, fed by a weigher, and lifts it to an air separator with exhaust for gravity delivery to a scourer on second floor. It then passes to the disc separator on the first floor. In a similar manner, the second blower lifts wheat from two 1,000 bu. mill bins to a cyclone for delivery to a Lord Brush via a balance bin and then to the mill.

The secondary lift from the cyclone then picks up wheat from the four

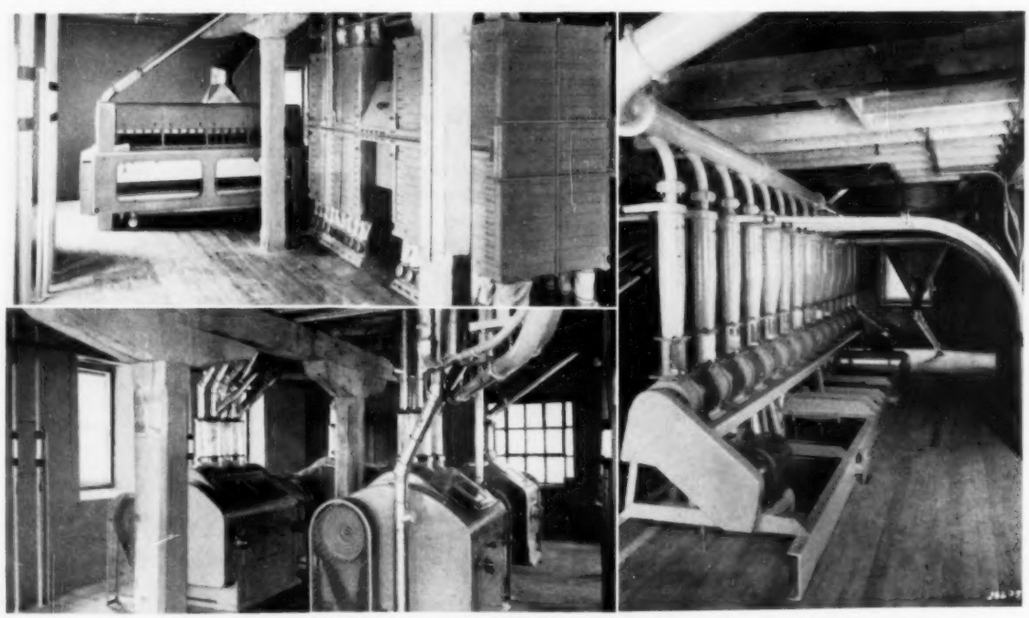
Graber Mills Starts Up New Pneumatic Plant

A NEW flour mill was recently started up by Graber Mills, Inc. at Canton, Ohio. The new mill was equipped by the Buhler Mill Engineering Co. of Minneapolis. The mill as well as the cleaning house are completely pneumatic.

Graber Mills was organized in 1934 by Henry D. Graber and is now operated by his son and daughter, Robert L. Graber and Dorothy E. Lambright. Flour has been milled in this location for more than 50 years, first by a long system installation, later replaced by four Anglo-American Midget Marvel units of 520 cwt. capacity, which have now been replaced by the Buhler system.

Major alterations to the interior of the building were completed and now the new system occupies only one half of the space formerly required, because the pneumatic lifts are near the walls and require less space than elevator legs.

The new mill has a 24 hour capacity of 500 cwt. of soft winter wheat flour using four roll stands 10" x 40". Eight pairs of rolls are subdivided, so that the plant has five breaks and seven reductions. All equipment is Buhler, except some existing machinery in the cleaning house, and the installation was supervised by Buhler engineers.



Here are views of the modernized interior of plant of Graber Mills, Inc., at Canton, Ohio

G. F. R. Nicklin, premier of Queensland, left, and C. W. Russell, managing director of Barnes Milling, Ltd., inspect the mill.

1,000 bu. conditioning bins and takes it to an air separator with exhaust for delivery to a second waterwheel damper and then to the two mill bins.

The system provides a closed circuit for the transfer of screenings, via a reel, for grinding and ultimate transfer to the pollard conveyors. Feeders of the BQm type are fitted above the wheel valves which feed the blow-lines under the bins.

Ambition Fulfilled

The start-up of the new mill marks the fulfilment of a long-term ambition of the managing director of the company, C. W. Russell.

Addressing more than 200 official guests at the opening ceremony, Mr. Russell said: "The great problem of industry today is the very steep rise in costs—a problem which is threatening, in particular, our rural industries. We have sought to make our contribution to the problem by cheaper production here."

Sifters and purifiers on the platform floor.

Mr. Russell said that when the premier pressed the starting button to set the new plant officially in operation, the price of his company's flour would be reduced in all the mill towns of the Darling Downs and in Roma to Brisbane prices. This was in no sense price cutting, but was being done to correct an anomaly which had existed for years. It was in every way wrong that such a price difference should exist, Mr. Russell said.

Mr. Russell continued: "For years I have thought and argued that the government should make this readjustment, now I realize that that was an entirely wrong approach.

Responsibilities Cited

"Private enterprise has its responsibilities, and if it is to function properly and maintain its prestige in this land it must itself see that justice is done, and not stand on the sidelines and cry to governments. We've had too much of that! A proper sense of responsibility is the essence of our free system, and it is the answer to price control."

Robinson roller mills with direct lift of stock and individual motor drive at the Barnes mill.

TECHNOLOGISTS SEE NEED FOR FORTIFICATION OF FOODS SUCH AS BREAD AND PROCESSED CEREALS WITH VITAMIN B_6

While a "minimum daily requirement" has not yet been established for Vitamin B_6, the most recent data suggest the human need for this nutrient may be even greater than for thiamine and riboflavin. A composite of recent studies indicates that as much as 2-7 mg. of B_6 may be desirable in the daily diet.

Although Vitamin B_6 is widely distributed in foods, a large portion appears to be lost or destroyed during processing or cooking. One study contrasting the B_6 content of wheat fractions shows that while whole wheat flour contains approximately 2.09 mg./lb. of B_6, patent flour contains only 0.99 mg./lb.—a loss of 50% B_6 content through processing. Almost all white breads on the market today contain only 0.45 mg. of B_6 per one pound loaf. When you add to this the fact that meat in cooking has been found to lose as much as 57% of its B_6 content and that canning and processing of foods markedly reduces their natural B_6 content, you can see evidence of a marginal B_6 intake in the diet today.

There would appear to be good reason for food processors to consider fortifying their products with Vitamin B_6.

If you would like further information on this subject, write Pfizer for a copy of Technical Bulletin 96 and "*VITAMIN B_6—The Case for Dietary Enrichment.*"

* * *

New Facts About Lysine Supplemented Bread

The quality and efficiency of wheat protein can be markedly improved by supplementation with the essential amino acid, L-Lysine. (Pfizer produces L-Lysine by a unique fermentation process assuring highest quality.)

A recent nutritional report compared the protein quality and quantity of white bread, protein bread and egg. It shows that nine slices of ordinary white bread are required to equal one egg in terms of quality and quantity of protein. If white bread is supplemented with lysine, only five slices equal one egg.

The report shows that protein breads can be improved in a similar manner. If protein bread is supplemented with lysine, three and one half slices instead of five provide the same protein quantity and quality as one egg.

If you would like further information on lysine supplementation of bread and other products such as breakfast cereals, write to Pfizer for Technical Bulletin 89, "*L-Lysine Monohydrochloride.*"

* * *

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Grass-Wheat Hybrids

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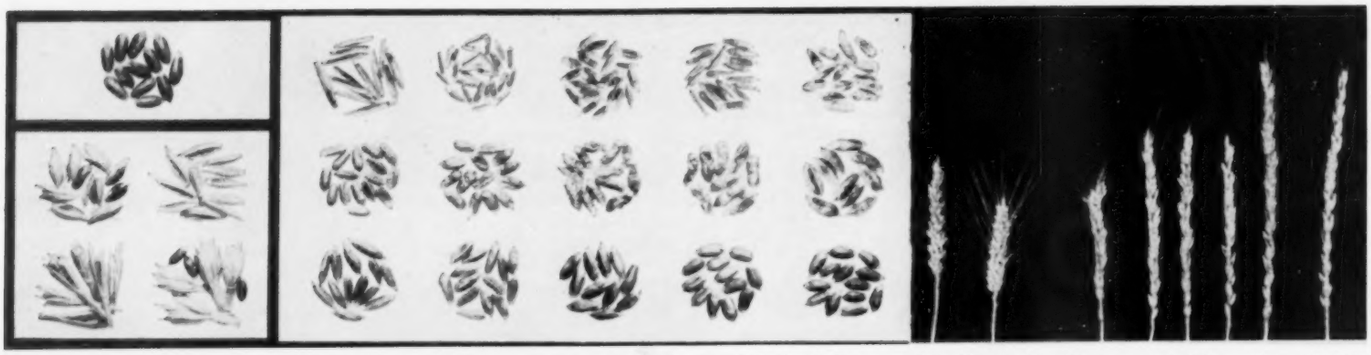

Left, clumped spikelets and seeds adhering to husks are common fault of hybrids (below); wheat (top) must thresh clean. Center, evolution of the grass-wheat hybrids shows in the samples of seed produced by crossing two ancestors—agropyron (in hulls and hulled, first two, top row) and commercial wheat (lower right). Right, six spikes representative of new hybrid perennial wheats (right) for California have more seeds per head than state's two leading spring wheats (typical heads shown at left). Grass-wheat crosses have been under study for the past 35 years.

OUT of grass-wheat crosses studied by the U.S. Department of Agriculture and state agricultural experiment stations for 35 years have come lines that combine many useful characters. These include disease and insect resistance, drouth tolerance, and a measure of perennial-growth habit.

So far, no commercially important perennial hybrid wheats have been developed. But the hybrids figure importantly in breeding desirable qualities into wheat.

The hybrids came from work begun in 1923 by ARS agronomist W. J. Sando (retired), who crossed wheat with Agropyron elongatum (wheatgrass), A. trichophorum, and others at the old Arlington (Va.) station.

The Agropyron genus was selected as breeding material because Mr. Sando believed it offered winter hardiness. He made little progress in getting this into wheat, but found useful disease and insect resistance to transfer. It took 12 years of determined effort to create the original crosses, 40,000 pollinations of these to obtain a handful of seeds, and 23 years of further breeding to bring about the present encouraging hybrids.

Some of the first-generation wheat-agropyron crosses have lived for 17 years, but they are more like giant grasses than wheat. Mr. Sando made thousands of backcrosses to wheat and intercrosses to transfer disease and insect resistance from agropyrons to wheat. His perennials have not lived beyond the fifth year and have become progressively less productive after the first year.

Mr. Sando sent his original hybrids in 1937 to more than a dozen American cereal breeders. Among them was ARS agronomist C. A. Suneson, engaged in cooperative work with the California station at Davis. Primarily interested in developing wheats with the perennial habit of the hybrids, Mr. Suneson backcrossed them to spring wheat and intercrossed the progeny. He has developed what he believes to be a true perennial wheat that might lead to a commercially available wheat in a few years.

Short-lived Perennial Looks Good

Mr. Suneson's present perennial hybrids have a life of about four years under conditions at Davis, with progressively smaller yields after the first year. In recent tests, two perennial wheat-agropyron selections at Davis yielded as well as the best local wheats in the first crop. With no weed control or fertilization, the second yield was at least 40 percent less. Subsequent yields were much lower. Management of the crop by weed control and fertilization after the first year has not been solved. These practices may, however, hold a key to increasing yields for the second through the fourth year.

Mr. Sando believes that crosses of wheat with agropyron offer greatest promise from the standpoint of disease and insect resistance, drouth tolerance, and protein increase in the over-all improvement of wheat.

Some hybrid plants have superior disease resistance. Some inoculated with 13 races of stem rust, for example, gave no reaction to 12 of them and only a trace of infection from the 13th. In certain tests, other plants have shown high resistance to leaf rusts, yellow-dwarf and streak viruses, mildew, smut, and septoria blotch. Some leaf rust-resistant selections at the Oklahoma station look particularly promising. Certain other selections have shown outstanding resistance to insects such as hessian fly, joint worm, and aphids.

High-protein flour was produced from one selection. And in a baking test, this high-protein flour produced some highly satisfactory loaves of bread.

Weakness Still Must Be Bred Out

Mr. Sando stresses that much work still needs to be done with these plants. Along with the desirable disease and insect resistance, drouth tolerance and long life, some selections have undesirable characteristics such as low test weight of the grain.

EDITOR'S NOTE: The report originally appeared in Agricultural Research, a publication of the U.S. Department of Agriculture.

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W. J. Sando bags his intergenus hybrids, on which he has just placed wheat pollen. It takes patience to relay grass genes into wheat.

fragility of the rachis (spike), seed tightly enclosed by and attached to the husk, loosely constructed seed heads, and sterility.

It's planned to continue incorporating the good qualities and dropping off undesirable ones from the agropyron-wheat crosses. Mr. Sando and Mr. Suneson believe vastly improved wheats can be bred from these valuable crosses. And the prospects are encouraging for wheat that will protect the soil and, under favorable conditions, give forage following a normal grain crop.

—BREAD IS THE STAFF OF LIFE—

Pathologist Joins Staff at NDAC

Dr. Donald J. Morton has joined the staff of the North Dakota Agricultural Experiment Station as assistant pathologist, and will devote most of his time to research on barley diseases. He will begin his investigations with studies of leaf and seed blights, along with work on root rots.

Dr. Morton is a native of Brooklyn, N.Y., and received his B.S. degree from the University of Delaware, his M.S. degree from Louisiana State University, and his Ph.D. degree from the University of California at Berkeley. He comes to North Dakota from the New Mexico State University, where he has been assistant plant pathologist.

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Lone Star AACC Section to Resume Meetings

The Lone Star Section of the American Association of Cereal Chemists will hold its first meeting of 1959 in March at Stillwater, Okla. The section has been invited to meet with the agronomy and plant breeding departments of Oklahoma State College, Stillwater.

The exact date of the meeting will be announced later. It is customary for the section to hold three meetings each year. These meetings are alternated between Dallas, Ft. Worth and a convenient location in Oklahoma. The invitation to meet at Oklahoma State College was extended to the section by Dr. A. M. Schlehuber of the college faculty.

During the past year the section held its first meeting in Ft. Worth. At this meeting a variety of papers were presented to the section. Dr. Wendell Reeder of Campbell-Taggart Research Corp. described an accurate and quick procedure for calcium determination in flour and feeds by means of a new indicator that he and his co-workers developed. Glenn Findley of Burrus Mills, Inc., gave a brief summary of the various topics presented at the American Society of Bakery Engineers meeting in Chicago. Fred T. Dines, president of Western Grain & Supply Co., Amarillo, Texas, brought the section up to date on new methods and equipment for aeration and fumigation of grain in elevators. E. E. Brown of Texas A&M experimental station presented a paper on microscopy used in quality control of feeds.

The section's mid-summer meeting was held in Oklahoma City. This meeting is held principally for a general discussion of the milling and baking characteristics of the new wheat crop, and is presented by a panel of cereal chemists reporting from various sections of the Oklahoma and Texas wheat areas. This panel of cereal chemists consisted of C. T. Newell, S. N. Vilm, G. W. Schiller, W. H. Carter, C. H. Stafford, Fred Patterson and Toby Fletcher.

The final meeting of the section was held at the Lake Texhoma Lodge in Oklahoma. It was a joint meeting with Texhoma District No. 7, Association of Operative Millers. Both associations contributed to the program.

Papers presented at this meeting were:

"Past, Present and Future of the Cereal Chemist" by Clinton L. Brooke, Merck & Co., national president of AACC.
"Preventing Bridging of Materials in Bins by Use of Pulsating Panels" by S. S. Peltzer, Gerotor May Corp.
"The Use of Methyl Bromide as a Fumigant in the Cereal Industry" by J. L. Maxwell, Dow Chemical Co.
"Turbo Milling" by George Schiller, The Pillsbury Co.

The last feature on the program was a panel discussion on the merits of the new wheat crop as viewed by the baker, chemist and miller. Moderators for this panel discussion were Dr. Wendell Reeder of Campbell-Taggart Research Corp., Dallas, and Stanley Orr, Russell-Miller Milling Co., Dallas.

Wheat Stored for 33 Years Still Produces Fair to Good Bread

Wheat stored for periods up to 33 years in U.S. Department of Agriculture and state tests made fair to good bread, with thiamine and protein content comparable to that of freshly harvested wheat. How long and how well wheat will keep are of particular interest when surpluses are great, as at present.

C. C. Fifield, Agricultural Research Service baking technologist, and D. W. Robertson, agronomist of the Colorado Agricultural Experiment Station, found that quality of bread recently made from most of the stored wheat samples was the same as for bread made in earlier tests. In a few cases, loaves from old wheat did not rise as much. Texture of crumb and grain scores generally showed a decline in quality compared with earlier years.

Storage had no consistent effect on protein content except that one third of the samples showed a slight apparent loss, possibly due to sampling error. Thiamine values, too, were the same for the stored as for the freshly-harvested wheat.

Wheat's ability to germinate decreased progressively with age but the rate of decrease was not the same for all samples. Kanred variety lost viability somewhat faster than Marquis. Practically all wheat was nonviable after 30 years but, nevertheless, continued to make good bread.

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Preliminary Report on Grain Contamination in North Dakota

By David M. Noetzel

ALL grain handlers, millers and commercial users of milled wheat are eminently aware of sanitation problems in flour and products using flour. Early research by the Food & Drug Administration pointed out that at least part of this contamination exists in grain prior to milling. As a result of this study, the inspection of raw grain in interstate transit was begun by FDA in 1952.

Initial seizures during this first year stimulated the grain trade to support a study whose objective was to delineate sources of filth in the grain flow from field to terminal elevator. The research project was under the direction of Robert Butler and Dr. C. E. Mickel who found that insect contamination increased as the grain left the farm and rodent contamination decreased during the same movement. Most surprising was the data which indicated 6.4% of the combined samples contained one mouse pellet or more per pint of grain analyzed. It was the latter information coupled with the fact that from 4 to 17 seizures of North Dakota wheat per year were taking place that prompted Dr. J. A. Callenbach to request the grant permitting us to study this problem.

The National Institute of Health grant was given on Oct. 1, 1956, and it is through the use of these funds that the following research has been possible.

I. GEOGRAPHIC DISTRIBUTION OF SAMPLES.

Preliminary sampling of bins was confined to Cass and Grand Forks Counties in the eastern one third of the state during the winter of 1956-57. Field sampling of the 1957 crop was carried out in 16 counties throughout the state.

Counties were selected so as to represent all major ecologic, geologic and geographic areas within the state. Because these field samples were found to be essentially clean, bin sampling of the 1957 crop was distributed according to marketing districts on a statewide basis. Sampling will be continued in a similar manner for the duration of the study.

II. FIELD CONTAMINATION.

Determination of presence and level of field contamination was carried out in two ways.

First, swathed grain was left in some 40 locations throughout North Dakota. This uncombined grain was to be left even following harvest to test for potential rodent contamination at this point. At approximately ten day intervals, samples were taken by placing a 5 by 10 ft. grain cloth under the swath and agitating the straw. Four such subsamples were taken at each location each time of sampling and the debris checked for all forms of filth.

In Table 1 we see that the average of filth/swath sample increases to the third week and then decreases whereas (Table 2) the highest per cent of samples contaminated occurs in the fourth week following swathing. The later decrease in both instances is probably due to weathering of each of the fecal types. It is interesting to note that insect fecal counts continue to rise indicating perhaps they are less susceptible to weather conditions.

Table 1. Types and Amounts of Filth Found in Windrowed But Uncombined Wheat

No. of days in swath	Average number of pellets per sample		
	Rodent	Bird	Insect
0-7	.21	.50	26.5
8-14	.67	1.20	40.5
15-21	1.13	1.93	58.9
22-28	1.10	1.67	64.5
29→	.60	0.0	65.7

Table 2—Incidence of Filth in Swath Samples

No. of days in swath	Per cent of samples containing following type of filth			
	Rodent	Bird	Insect	Total samples
0-7	23.1	38.5	84.6	13
8-14	31.8	36.4	95.4	22
15-21	47.8	38.1	100	23
22-28	59.1	45.5	100	22
29→	37.5	25.0	100	8

III. FIELD CONTAMINATION AS INDICATED BY COMBINED GRAIN.

Samples in this category were collected directly from the grain stream as the combine was unloaded. In the case of threshing six one-pint samples were removed from alternate one half bushels, while combined grain was sampled throughout the unload period.

Twelve of 112.9 harvest samples were collected from threshing machines and all were found to be free of filth. A total of 248 samples were collected from combines where grain was being directly combined and only one sample was found to contain

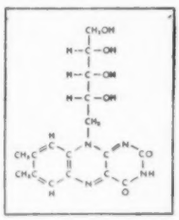
EDITOR'S NOTE: Mr. Noetzel is an assistant entomologist at North Dakota Agricultural College, Fargo.

The Vital Story

A Quick History. Independent investigators, working separately to unlock several of nature's doors, sometimes open up unsuspected relationships. This happened with vitamin B_2.

Investigations. About 25 years ago, several groups, notably Warburg's, were investigating a "yellow enzyme" obtained from yeast. Almost simultaneously other investigators were studying a food factor that aided growth of laboratory animals.

What they found. Proceeding with chemical analysis of this growth factor, the team of Kuhn, György, and Wagner-Jauregg noted a relationship between the growth-producing agent and the "yellow enzyme." Their findings, and those of other researchers along similar lines, were published in 1933. Eventually, riboflavin and an essential part of the yellow enzyme were found to be identical and the unity of an essential nutrient and cellular metabolism was established.



Isolation of pure riboflavin was achieved by Kuhn and his co-workers, and by Ellinger and Koschara, in 1933.

Nomenclature. Known in the United States as riboflavin, this vitamin has also been called lactoflavin, ovoflavin, hepatoflavin, and vitamin G.

SYNTHESIS

By 1935, two eminent chemists, working separately, had synthesized riboflavin, practically in a dead heat. Prof. Paul Karrer of the University of Zurich, a collaborator of the Hoffmann-La Roche Laboratories, produced the first successful synthesis. Five weeks later Richard Kuhn of Germany announced his synthesis of the vitamin. Prof. Karrer subsequently shared the Nobel Prize in Chemistry for his work in vitamins and carotenoids.

The Karrer synthesis forms the basis for chemical processes in widespread use today by Hoffmann-La Roche and other leading manufacturers throughout the world. Riboflavin is also manufactured today by fermentation methods.

CHEMICAL AND PHYSICAL PROPERTIES

Riboflavin is yellow, slightly water-soluble with a greenish fluorescence and a bitter taste. Its empirical formula is $C_{17}H_{20}N_4O_6$. Vitamin B_2 produced by the Roche process is identical in every way with that occurring in nature.

How does vitamin B_2 work? Riboflavin is a vital part of nature's chain of reactions for utilization of carbohydrate energy. It has been found to be a constituent of many enzyme systems and is thus intimately connected with life processes. It is probably required by the metabolic processes of every animal and bird as well as by many fishes, insects and lower forms of life. (In certain animals, however, the requirement may be synthesized by bacteria within the intestine.)

In the cells riboflavin goes to work attached to a phosphate group. This substance, known as riboflavin-5′-phosphate or flavin mononucleotide, may in turn be attached to still another essential substance, adenylic acid, forming flavin adenine dinucleotide. Either nucleotide then is attached to protein, thereby forming an enzyme, and takes its part in oxidation-reduction reactions.

Requirements in Human Nutrition. As we have seen, vitamin B_2 is essential to life. We have no special storage organs in our bodies for this vitamin, although a certain level is maintained in various tissues, with relatively large amounts found in the liver and kidneys.

MEASURING METHODS

In the beginning, riboflavin activity was described in "Bourquin-Sherman units" and requirements were thought to be very small. Subsequent research showed otherwise. Milligrams of weight became the unit and the Food & Drug Administration of the U. S. Dept. of Health, Education & Welfare established (July 1, 1958) a minimum daily requirement of 1.2 mg. of riboflavin for all persons 12 or more years old. For infants it is 0.6 mg. These requirements are designed to prevent the occurrence of symptoms of riboflavin deficiency disease. The minimum daily requirement for this vitamin for children from 1 to 12 years is 0.9 milligram.

Recommended allowances. The Food & Nutrition Board of the National Academy of Sciences—National Research Council, in its 1958 publication #589, recommends the following daily dietary allowances of riboflavin, expressed as milligrams. These are designed to maintain good nutrition of healthy persons in the U.S.A.

Men	1.8
Women	1.5
Women (pregnant; second half)	2.0
Women (lactating)	2.5
Infants (2 to 6 months)	0.5
Infants (7 to 12 months)	0.8
Children (1 to 3 years)	1.0
Children (4 to 6 years)	1.3
Children (7 to 9 years)	1.5
Children (10 to 12 years)	1.8

	Boys	Girls
Adolescents (13 to 15 years)	2.1	2.0
Adolescents (16 to 19 years)	2.5	1.9

pellets. This was later traced to combine-contained filth. Finally, of 869 samples where wheat was first windrowed, 18 samples were found to contain rodent filth, but only two of these were in excess of one pellet per pint of grain. Both of these latter samples were collected after Dec. 15 and could not be considered from normal harvest.

IV. BIN CONTAMINATION.

Previous studies have indicated the farm bin as the main source of rodent and possibly bird contamination. The North Dakota studies support these early findings and assumptions based upon them. Much more exact data has been made available as to distribution of filth within a given bin, the level of filth in pellets/pint within each bin, and the estimated amounts of filth present over the state.

Specific questions concerning the condition of the facility, the use of the facility, the type of farm operation, and the general condition of the farm have all been related to amounts of filth found on given farmsteads.

In general, the number or per cent of bins with any contamination is higher than was anticipated, while the number with excessive levels of filth (i.e., 0.5 pellet/pint or more) is less than expected. The most important single contributiing factor to the filth problem, and the factor which can probably be most easily remedied, is the condition of the doors.

Modified sampling will be continued for the coming two years with more detailed analysis of single farm situations receiving attention. It is hoped that we will be able to evaluate rodent controls in correlated studies, but our main concern is delineating the problem and its contributing factors.

Frank Warren

Frank Warren Named To New Merck Post

RAHWAY, N.J. — Merck & Co., Inc., chemical division, has announced that Frank W. Warren, regional agricultural sales manager, will head the new 13-state north Atlantic region for the company.

Activities of this new region will be centered in Teterboro, N.J., and will cover Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia.

Mr. Warren, who has been with Merck a number of years, has served as general sales representative, as manager of the general sales department and as industrial assistant to the general sales manager. On Dec. 1, 1957, he was named head of the former mid-Atlantic division, now incorporated into the new north Atlantic region.

The company also announced that Clarence W. Gibbs, sales manager for the northeast region, with headquarters in Boston, is retiring. Mr. Gibbs joined Merck as an office sales representative in 1937, serving in several areas of the sales division until 1948, when he became manager of the horticultural and insecticides department.

Mr. Gibbs assumed his present post in 1954. He has helped pioneer many Merck agricultural and animal health products. The northeast region has also been incorporated into the new north Atlantic region.

—BREAD IS THE STAFF OF LIFE—

Munson Employs Firm To Handle Export

UTICA, N.Y.—Peter A. Karl, Inc., export manager here, has been appointed as the new export division for the Munson Mill Machinery Co., manufacturer of mill machinery since 1923, T. Alun Powell of Munson has announced. "The appointment is a result of the mounting interest in our line abroad," stated Mr. Powell. "The number of inquiries we have received from Europe, the Middle East and South America, about information on our attrition and hammer mills and rotary batch mixers made it necessary for us to employ the services of a seasoned and well-established export firm."

# of VITAMIN B_2

(Riboflavin)

by Science Writer

Deficiencies of vitamin B_2 appear in several ways in human beings. The eyes, the skin, the nerves, and the blood show the effects of too little riboflavin. Laboratory animals have demonstrated that a riboflavin-deficient diet can cause death of adults and can slow or stop growth in the young. Female animals, deprived of riboflavin in the diet, may produce offspring with congenital malformations.

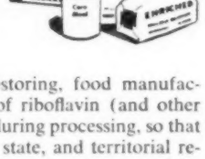
Medical uses. To overcome and control deficiencies in human beings, physicians have pure riboflavin available for administration by injection or orally, by itself or with other "B" vitamins or multi-vitamin-mineral combinations.

How do we get our daily riboflavin? Vitamin B_2 has wide distribution throughout the entire animal and vegetable kingdoms. Good sources are milk and its products, eggs, meats, legumes, green leaves and buds. Whole-grain cereals have significant but not large amounts of riboflavin.

ADDITION TO FOODS

Cereal foods play a large part in our diet. To produce the white flour almost all of us want, millers are obliged to remove parts of the wheat that contain much of the grain's riboflavin and other nutrients. In addition, cereal grains are not rich sources of riboflavin. Millers meet this problem by *enriching* the grain foods for which federal standards exist with vitamins B_1, B_2, niacin and the mineral iron. In the case of vitamin B_2, however, they do more than *restore* the processed food to its natural riboflavin level; they *fortify* the food with enough of this essential vitamin to make it nutritionally more valuable than it was in nature.

Acting to protect the good health of millions of Americans, bakers and millers adopted *enrichment* of white bread and white flour in 1941. Since that time, other foods, such as macaroni products, corn meal and grits, farina, pastina and breakfast cereals have had their food value increased by enrichment with pure riboflavin and other vitamins and minerals.



When enriching, fortifying or restoring, food manufacturers add the necessary quantity of riboflavin (and other vitamins and minerals) to the food during processing, so that the finished product meets federal, state, and territorial requirements or contributes to the consumer an amount of the vitamin that dietary experts believe significantly useful.

PRODUCTION

Prof. Karrer's synthesis of riboflavin was a laboratory success. Adapting the process to commercial production, however, demanded original thinking by chemists at Hoffmann-La Roche. The production of riboflavin by chemical synthesis requires the production of ribose, a rare sugar, at an early stage in the process. This special sugar must be made inexpensively if the synthesis is to be practical. Sugar chemistry is a difficult matter. In a brilliant piece of work, the Roche chemical experts developed a method to produce ribose on a commercial scale by an electrolytic process, thus overcoming a most troublesome problem. Subsequently, Roche chemists developed the first practical synthesis for riboflavin-5′-phosphate, identical with natural flavin mononucleotide.

Picture three streams joining to form a river and you have a simplified idea of the Roche process for synthesizing vitamin B_2. O-xylene and glucose are processed separately to form xylidine and ribose respectively. These are joined to form ribitylxylidine, which is then converted to ribitylaminoxylidine. Starting separately with malonic ester, which is processed through intermediate stages to alloxan, the third "stream" is then joined with ribitylaminoxylidine to form riboflavin. Purification occurs at each step of the synthesis. Riboflavin Roche* equals or exceeds U. S. P. standards.

By the tons. So efficient is the Roche process that pure riboflavin is produced *by the tons* for use in pharmaceutical products and processed foods. An interesting development by Roche is the production of riboflavin in different forms related to the method of end use. Roche* Regular riboflavin U. S. P. is especially useful in dry enrichment premixes, powdered dietary supplements, pharmaceutical tablets and soft gelatin capsules. Roche* Solutions type is preferred for the manufacture of solutions having low concentration. Roche* Riboflavin-5′-Phosphate Sodium is a highly and rapidly soluble riboflavin compound favored for all pharmaceutical liquid products and some tablets, lozenges, and capsules. It has a more pleasant taste than the bitter U. S. P. riboflavin.

This article is published in the interests of pharmaceutical manufacturers, and of food processors who make their good foods better using pure riboflavin Roche. *Reprints of this and others in the series will be supplied on request without charge. Also available without cost is a brochure describing the enrichment or fortification of cereal grain products with essential vitamins and minerals. These articles and the brochure have been found most helpful as sources of accurate information in brief form. Teachers especially find them useful in education. Regardless of your occupation, feel free to write for them. Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 1956 Bourdon St., St. Laurent, P. Q.

Worth Looking Into

New Products
New Services
New Literature

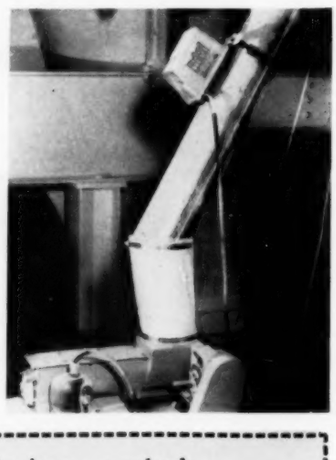
This reader service department announces the development of new and improved products, new services and new literature offered by manufacturers and suppliers. Claims made in this department are those of the firm concerned. Use the accompanying coupon to obtain the desired information.

No. 2089—Moisture Determination

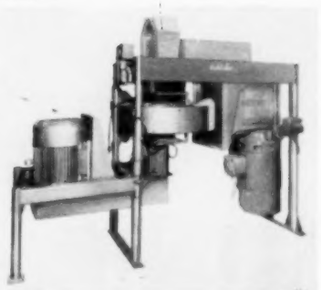
Moisture determinations in wheat grain, wheat flour and tempered wheat samples in one minute by the Model 104 Nuclear Magnetic Resonance (NMR) Analyzer are described in Material Study Report 1058, offered by Schlumberger Well Surveying Corp., Ridgefield Instrumentation Division. The study reveals that rapid, accurate measurement of moisture content in wheat grain, can be accomplished by the NMR techn'que. Analysis of tempered wheat suggests possible solution to spontaneous heating of wheat in storage. Calibration curves for wheat flour and wheat grain are included. The report may be obtained by checking No. 2089 on the coupon.

No. 2090—Bin Vibrator

Because of space limitations and other equipment involved in the packaging line of its Chicago plant, the Eckhart Milling Co. installed this tubular chute at a sharp angle. All-purpose flour is the material which is being fed from an overhead bin through this tubular chute to equipment which dribbles about 4 oz. of the flour into moving packages in a final filling operation. After the chute was installed, it developed that the flour was plugging up because of the angle. However, this problem was solved by the installation of an Eriez HI-VI bin vibrator directly onto the chute above the angle joint. The bin vibrator operates intermittently, only when the feeding equipment in the filling operation is running. For more information check No. 2090 on the coupon.



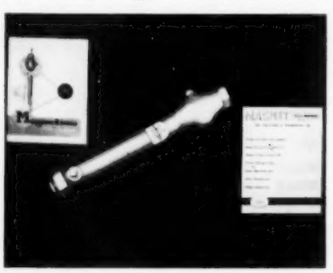
No. 2091—Impact Mill



A new type of impact mill, featuring a counter-rotating action, is now being introduced by the Entoleter Division of Safety Industries, Inc. In Entoleter's conventional impact mill only the rotor in the center spins, throwing the material to be reduced or dispersed against a stationary outer wall. In the new mill, the outer wall revolves in the opposite direction to the rotor, thus compounding the impact force at any given rotor speed. This makes possible particle size reduction in the sub-sieve ranges. The new mill is called ControMil Series 27. A mill has been installed and is now available for product testing and application engineering. For more information check No. 2091 on the coupon.

No. 2093—Water Conditioner

The availability of Magnetron, a water conditioning instrument that prevents scale and corrosion by introducing energy to the salt and mineral molecules in water has been announced by Magnetron Water Conditioner.



The energized molecules, the firm said, lose their ability to adhere to themselves or the metal over which they pass, for a period of time. The unit is a permanent installation and is not a water softener. For more information check No. 2093 on the coupon.

No. 2092—Bag Ejector

Manual lifting of filled bags is eliminated by a new automatic bag ejector which is described as part of a mill feed packing system in a four-page, two-color bulletin now being offered by Richardson Scale Co. This new bag ejector, which automatically transfers filled bags from a bag table onto a bag sewing conveyor belt, makes it possible for one man to handle weighing, packing and sewing operations. It may be applied to existing Richardson MSM packers as well as new machines. Copies of the bulletin may be obtained by checking No. 2092 on the coupon.

No. 7349—Bulletin on Roller Mills

The availability of a four-page illustrated technical bulletin describing one, two, three pair high and double roller mills has been announced by Sprout, Waldron & Co., Inc. Bulletin 153-A also describes the function and operation of roller mills and explains construction and design details. Specification tables are included giving length, width, height, roll speeds, horsepower range and shipping weights. For copies of this bulletin, check No. 7349 on the coupon and mail to this publication.

No. 7351—Fork Lift Truck

A diesel-powered fork lift truck designed for extra safety in areas and industries where additional safety is needed has been introduced by Towmotor Corp. Designated the Towmotor Safeguard Diesel Fork Lift Truck,

the unit is available in nine models with lifting capacities ranging from 3,000 to 12,000 lb. The truck is completely devoid of electrical components, the company said. For further information about this product, check No. 7351 on the coupon and mail.

No. 7352—Data Sheet On Rail Car

General American Transportation Corp. announces the availability of an information sheet on its new line of Dry-Flo covered hopper cars. Included are capacities, loading and unloading information, anti-contamination facts and specifications. The sheet also contains photos, illustrations and diagrams. For copies of this information sheet, check No. 7352 on the coupon and mail to this publication.

No. 7286—Bag Stacker Bulletin

One man push-button loading of boxcars and trucks is the subject of Bulletin No. 75, being offered by Power Curve Conveyor Co. The illustrated publication contains information on all of the units that make up the conveyor. For copies, check No. 7286 on the coupon and mail to this publication.

No. 7287—Filling Machine Feeder

Model "CA Whiz-Lifter," a device for feeding one or more filling machine operations, has been introduced by Frazier & Son. The unit is designed to handle almost all types of product from solids to powders, the company says. The unit has interlocking buckets that travel on a

Send me information on the items marked:

☐ No. 2089—Analyzer	☐ No. 7311—Shovel
☐ No. 2090—Vibrator	☐ No. 7335—Belt
☐ No. 2091—Impact Mill	☐ No. 7349—Bulletin
☐ No. 2092—Ejector	☐ No. 7351—Truck
☐ No. 2093—Conditioner	☐ No. 7352—Data Sheet
☐ No. 7271—Scale	☐ No. 7355—Plant Layout
☐ No. 7281—Indicator	☐ No. 7357—Bins
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horizontal plane at point of fill. The Whiz-Lifter can feed more than one machine as well as discharge from either side or from alternate sides, the company says. For more complete information, check No. 7287 on the coupon and mail to this publication.

No. 7355—Story on Plant Layout

The availability of a case history story describing Berlin Milling Company's plant layout and operations has been announced by Sprout, Waldron & Co., Inc. Bulletin F-30 illustrates and describes control equipment, mixing, pelleting, cooling, receiving and distribution. It also contains a flow chart on the complete new plant which was designed to deliver 2½ times as much feed production with half as many workers, the company said. For copies, check No. 7355 on the coupon and mail.

No. 7281—Bin Level Indicator

Both standard and explosion-proof models of the Roto-Bindicator now bear the label of Underwriters Laboratories, Inc., the company announced. Four standard and four explosion-proof models are included in the company line. For information about any of the models, check No. 7281 on the coupon and mail.

No. 7357—Corrugated Grain Bins

Corrugated grain bins that can provide up to 15,000 bu. auxiliary or full time elevator storage have been announced by Butler Manufacturing Co. The galvanized steel bins are 18 ft., 21 ft. and 24 ft. in diameter with heights up to 40 ft. Push-button loading and unloading is possible with all these commercial size bins, the company says, and the bins are equipped with an auger tube for center draw-off of grain or they can be erected with concrete hoppers and bazooka augers, flat bottom with screw conveyor or other unloading equipment. Check No. 7357 on the coupon and mail for more complete information.

No. 7311—Bulk Handling Shovel

An "Electro-matic Scoop" for handling and unloading bulk material has been announced by Munson Mill Machinery Co. The shovel features unit construction and low horsepower requirements through an integral gear reducer and magnetic clutch which provides power to the shovel.

The unit is operated by magnet controls which are handled by the operator's thumb. For more information, check No. 7311 on the coupon and mail to this publication.

No. 7361—Conveyor System

An elevator and conveyor system for bulk grain storage has been announced by the Wyatt Manufacturing Co., Inc., and will be marketed with the Wyatt line of Bazooka spiral grain loaders. The method utilizes standard Bazooka augers in 4, 6, 8 or 10-in. sizes. According to company literature, lengths up to 350 ft. are

BACK TO SCHOOL—Shown on the steps of a building at Alabama Polytechnic Institute in Auburn is a group of executives and salesmen of Sterwin Chemicals, Inc., preparing to re-engage in laboratory work. The occasion was a three-day sales meeting, which was held by the company as a supplement to its annual conference. The talks were given over to a review of 1958 accomplishments and a discussion of 1959 sales goals and promotional campaigns for Sterwin products and services to the baking and milling, food, confectionery, ice cream and sanitation fields. Pictured in the front row, starting second from left: William X. Clark, vice president in charge of sales; Robert S. Whiteside, president; Dr. J. K. Krum, assistant technical director, and L. R. Patton, assistant sales manager.

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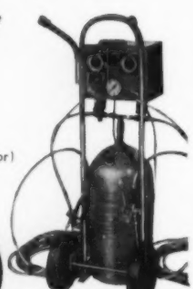

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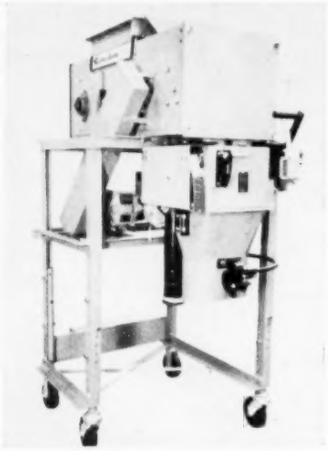
PRESIDENTIAL VISIT—Clinton L. Brooke, left, Merck & Co., Rahway, N.Y., national president of the American Association of Cereal Chemists, paid a visit to the Northwest Section of AACC in Minneapolis recently. He is pictured with the section officers. They are, left to right, E. B. Liebe, grain branch, U.S. Department of Agriculture, treasurer; Ray H. Anderson, General Mills, Inc., secretary; Harry G. Obermeyer, GMI, chairman, and R. J. Pickenpack, GMI, vice chairman. Mr. Brooke told the section about the past, present and future of AACC.

feasible in the larger tube sizes. Power is furnished by electric motors, the company says, although on smaller units gasoline engines or tractor power may be used. For more information on this system, check No. 7361 on the coupon and mail to this publication.

No. 7271—Gross Bagging Scale

A new gross bagging scale, with feeder, featuring an eye-level balance indicator which helps eliminate weighing errors, has been announced



by the Richardson Scale Co. The indicator operates on the torsion principle. According to Richardson, the unit, called GA-17 Gross Bagging Scale, was developed to meet the needs of small plants for a one-man bagging operation. The scale is designed for use with open mouth textile and multi-wall paper bags and provides for filling 10 to 140-lb. bags. For more information, check No. 7271 on the coupon and mail to this publication.

No. 7335—Conveyor Belt

A conveyor belt made from heavy-duty duck base fabric for high-speed grain leg service, has been announced by the Imperial Belting Co. Called Black Rexall, the belt features double-stitching and is impregnated. For more complete details about this product check No. 7335 on the coupon and mail to this publication.

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VISIT TO USSR

(Continued from page 1a)

If a student fails, he is compelled to return to his previous employment. Judging by the appearance of the classes, students come from all over the Soviet Union and no doubt after two years' residence in Moscow, return quite impressed with the industrial and cultural developments in that city. In addition, the students learn to esteem the quality of Soviet milling equipment and milling technics, as well as the virtues of the wheat produced in the Soviet Union. With time, these considerations will probably affect the world marketing of wheat and flour, since the Soviet Union is committed to competition in a wide variety of ways.

THE TRAINING PROGRAM. The students spend two years studying mathematics, physics, chemistry, and mechanical and electrical engineering, principally, with a few liberalizing subjects such as languages, economics and the biological sciences. Students reside at the school in dormitories and apparently apply themselves to their work very well. There are large woodworking and metal working shops and these are operated not only as training processes, but also for the manufacture and sale of milling equipment. There is reason to believe that the students when graduated are well trained in flour mill operations. Certainly, they are much better trained as millers and in mill maintenance than are most of the graduates from the Milling Department at Kansas State College, but one wonders if they are as well trained to use their talents and ingenuity later for the betterment of the milling industry as students educated in the U.S.

Most of the mill equipment is made in the USSR; it does not differ in basic design from the equipment in common use throughout the world. There are some pieces of equipment of standard make such as that manufactured by MIAG, Buhler and Simons.

Most delightful lunches were served at the milling school and there was ample opportunity during lunch, and afterwards, for discussions. When it was discovered that I had visited the milling schools in Paris, France; Braunschweig, Western Germany, and St. Gallens, Switzerland, my hosts plied me with many questions regarding the equipment in use, the sizes of the schools, the types of instruction, and the professional staffs of these other schools. I promised to send complete information regarding the educational program in milling technology at Kansas State College. They were not aware that the department had suffered a fire more than a year ago and, when informed, seemed quite sympathetic with our present situation. They had a number of ideas regarding the type of pilot plant mill that should be constructed and seemed to take it for granted that the milling facilities which were lost by fire would be replaced with modern equipment.

NEED FOR EXCHANGE OF INFORMATION. We in this country feel that we have been isolated from the Soviet Union, but we should remember that those who reside within the Soviet Union have likewise been isolated from much of the rest of the world, and now they are most anxious to know what has been going on elsewhere.

My visit to the USSR milling school was a delightful experience. At no time did anyone direct the conversation into topics that might be controversial, such as Sputniks or relative military strength. I had the feeling throughout my visits in the USSR that, among the people with whom I dealt, there was a genuine desire to promote mutual friendship, understanding, and avoid conflicts. It is a challenging experience to exchange scientific ideas and develop friendships among persons with whom one has so much in common. The word, "peace", crept into our talks frequently, and I assured my hosts that I considered myself to be a typical citizen of my country and that my desire for peace was typical of my country.

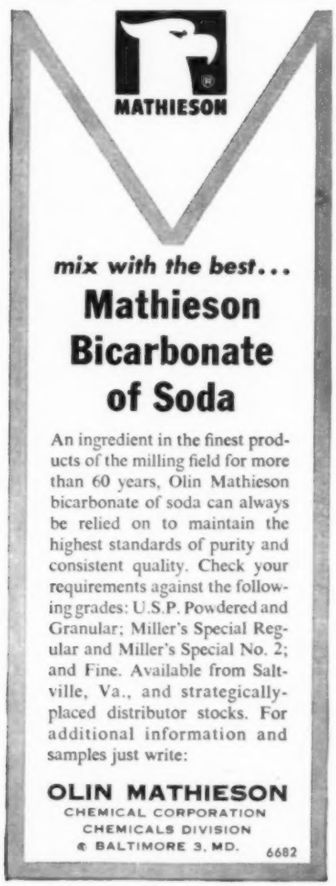
VISIT TO GRAIN RESEARCH INSTITUTE. Since neither Dr. N. Kozmina, director of the Soviet Research Institute for Grain, nor Dr. L. Ljubarsky, the USSR representative to IACC, with whom I visited in Vienna, were in Moscow when I was there, Dr. S. D. Khusiel, deputy director of the institute, met me when I arrived at the institute and, in turn, introduced me to the entire staff. The institute is located outside the city limits of Moscow in a large, fairly modern building. The interior of the building is well furnished and well maintained, and the offices and laboratories are modestly but adequately furnished and equipped. Again, I had the feeling from the moment I met Dr. Khusiel that I was a welcome guest and that he and his associates were just as anxious to talk to me about milling and cereal research as I was to visit with them.

After a few moments seated around a conference room table, I was taken on a tour of inspection of the institute's facilities. The first section visited was a large area devoted to research on the testing of grains. There were a series of corrugated and smooth rolls mounted on stands about 4 ft. high with sifters under each roll stand. There were small sized conditioning units and a wide variety of small grain cleaning apparatus. Also, there were a number of very excellent schematic diagrams mounted in various locations which showed the steps in grain cleaning, conditioning and milling. There were nicely mounted displays of the types of grain grown in the USSR and the products which were manufactured from the various grains.

Next, my hosts took me through several biological and physical testing research laboratories. Problems which are being pursued appeared to be about the same as occupy the attention of research workers in other parts of the world, such as, for example, the moisture relations in grain, storage problems, kernel hardness, analytical tests, enzymes, conditioning, and milling engineering developments. Some excellent slow-motion picture work has been done at the institute on the effect of the rate of feed to rolls, and particle size and shape on the grinding action of corrugated rolls running at different differentials and at different arrangements of corrugations such as sharp to sharp, sharp to dull, etc.

PERENNIAL WHEAT. Excellent appearing perennial wheat types were shown to me. One sample in particular had dark, hard and plump kernels which were unusually long with a rich, dark brownish-red color. I inquired about the protein content and was told that it was 16%. On further questioning, I found that protein was calculated on the basis of N x 6.25. On the basis of N x 5.7, which is the USSR, although some of the best types were being grown in field plots from which they expected a sufficient amount for pilot plant milling tests.

PILOT FLOUR MILL. The institute also operates a large modern pilot plant flour mill of 125 tons capacity. Using the factor used in this country, the protein would be slightly in excess of 14.5%. I inquired about the quality of the protein and was told that it was excellent; however, I asked if I could see some of the dough development curves representative of these perennial wheats and, although I was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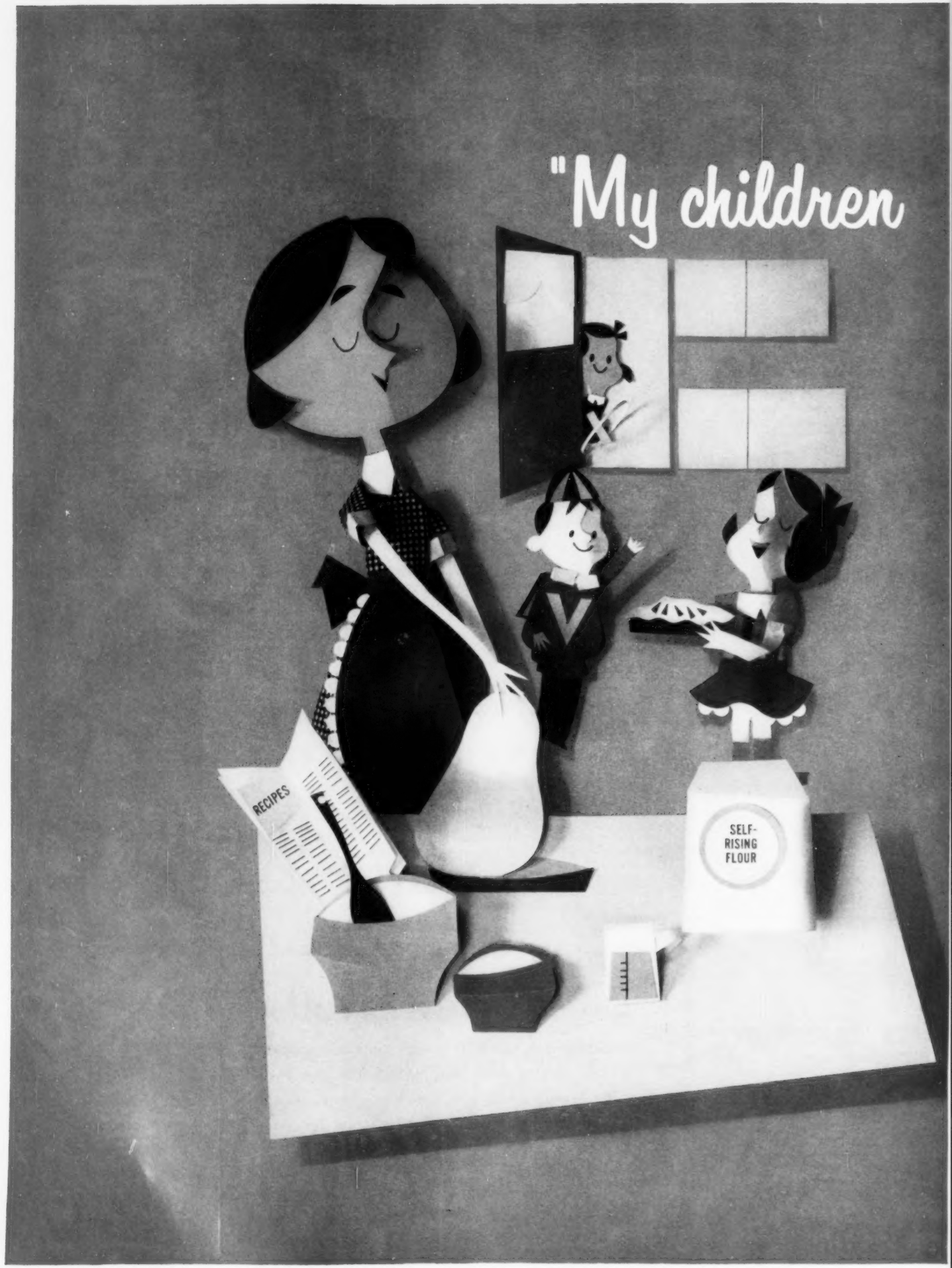
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* *Actual quotation from a letter in Victor's files.*

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not shown any, I was told that the quality was definitely inferior to that of the common bread wheats now being grown. I told them that this also was the state of the research on perennial wheat in other places in the world insofar as I knew. They said that no perennial wheat was being commercially produced in the pacity per day. I was taken first into the control room of this research mill. A good sized room is occupied completely with a vast assortment of controls, buttons, gauges, dials and charts. I was told that the entire control of the mill centered in this one place and that such information as the flour and feed yields, wheat moisture and temperature, roll pressures, flour color and flour moisture were always recorded and regulated by a system of push buttons. The mill is all pneumatic and there are many new devices and controls in evidence on almost every machine. The mill equipment and special devices attached to equipment result from using some imported equipment and some made in the USSR or satellite countries such as Eastern Germany and Hungary.

No use was being made of air classification of particle sizes, but the subject was under experimental study and developments elsewhere in the world were known to the research staff of the institute. Also, the principles of the Hungarian wheat cutting roll, which was displayed at the Brussels World's Fair and is now in operation in a mill in Budapest, have been the object of careful study in the USSR. I was told there are now 50 pneumatic flour mills of all sizes in the USSR. I mentioned the formula feed industry and the tremendous strides being made in the field of animal genetics and scientific feeding, but did not manage to create any discussion of the subject. This leads me to believe that, thus far, research on feeding in the USSR has not progressed to the point where the scientists feel they have anything new to discuss.

Baking research and test baking of wheat varieties are done in another institute. Not being aware of this fact in advance, I had no opportunity to visit this phase of cereal research. Some experimentally baked bread was on display at the institute.

The visit to the grain research institute was a rewarding experience. I never have had a warmer welcome anywhere. Our conversations were frank and revealing. I learned a great deal from them and they, in turn, had an opportunity to study an average citizen of the U.S., one who was interested in milling and cereal technology, and one who had just as keen a desire as they, to promote mutual friendship, understanding, and trust.

WHAT OF THE FUTURE? The obvious question now is: Where does the U.S. stand in comparison with the Soviet Union regarding education in milling and in grain research? It is easy to answer the question regarding where the U.S. stands in milling education compared to the Soviet Union, Western Germany and Switzerland, because the aforementioned countries have equipment for training students in this field, and the U.S. does not. Kansas State College has been, through the years, the only institution (curriculums in milling at Pennsylvania State University and the University of Minnesota were discontinued) to continue university instruction in milling, and with the fire of 1957, the last equipment for student instruction was removed. The reaction among some top level executives in the milling industry in the U.S. has been that there is no need to replace these facilities. Perhaps their judgment is correct, but the unfortunate situation is, that if they are wrong, years lost in the educational process cannot be salvaged. Competition in the food field, both domestically and worldwide, will increase, and with this increase will come more demands for high grade plant managers and superintendents.

Automation decreases the need for muscle, but up-grades the demand for trained brains, and trained brains in quantity come only through education. In some other countries, this challenge is being met in the areas of milling and cereal technology, and in this country the challenge is being met in the general concern of the public for adequate provision for higher education. The state of Kansas and many manufacturers of equipment have shown every indication of a desire to do their part to keep the U.S. abreast, if not ahead, in the field of milling technology, but there seems to be still some reluctance on the part of the milling industry to regard the situation as one of any special or vital concern to them. A well operated pilot plant flour mill can be an aid not only in student training and various types of research programs, but as an instrument for developing tremendous international good will, understanding, and appreciation of the U.S. as a producer of wheat and a manufacturer of flour, thus enhancing international trade in these products.

It is important to realize that fire destroyed the only publicly-owned pilot plant flour mill, namely, that maintained at Kansas State College. During the year previous to the fire, the Department of Flour and Feed Milling Industries devoted 298 man days to foreign visitors, which fact gives an idea of how these facilities were used to help our government's foreign programs. We, in the U.S., are rightly proud of our efforts with Radio Free Europe, the International Cooperation Administration programs and the efforts spent in various ways to help other countries improve their economic position and indirectly to preserve our way of life. It, at first thought, may seem like an insignificant contribution to mutual understanding among nations to return to their respective countries a few persons who have studied milling or cereal technology in the U.S. Food being vital to the well-being of nations, and the milling of wheat into flour being such an old and universally understood food processing operation, there is no human endeavor which is less controversial nor less likely to be misunderstood. The USSR is not unmindful that placing young trained milling technologists throughout their country and its satellites will help to strengthen their nation and provide a familiarity with Soviet milling operations in addition to knowledge of the supply and quality of Soviet grains. Are we equally wise in our preparation for the future?

I am confident that there can be many advantages to contacts within the USSR. No grain farmer or grain dealer with concern for international trade can afford to be indifferent to the production and marketing of grain by the USSR. Once a better understanding is established between the people of the U.S. and the USSR, we can look for the development of trade, but this cannot happen without a fuller knowledge of grain production, domestic needs, and government policies. Right now, of course, it is illegal to trade with the USSR. Since trade, when and if developed, will likely take the form of barter transactions, we must have a knowledge of raw materials and manufactured products in the USSR which may be acceptable import commodities for exchange. The initial step to these events is personal contacts, because misunderstandings tend to disappear when peoples get to know one another. Milling and cereal technology are areas in which there can be many contacts without the development of conflicting ideologies, politics or religion entering into discussion to provide focal points for misunderstanding and distrust.

The Soviet and U.S. Academies of Sciences are about to conclude an agreement providing for an exchange of scientists between the two nations. The fields of cereal technology and milling should be included in this exchange of scientists.

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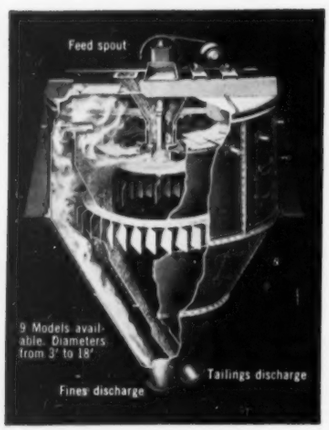

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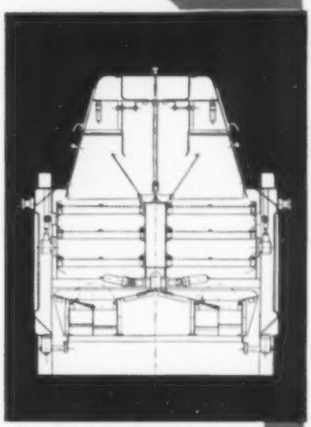

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